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Testing for statistical arbitrage in credit derivatives markets ☆

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ABSTRACT

This paper studies statistical arbitrage opportunities in credit derivatives markets using strategies combining Credit Default Swaps (CDSs) and Asset Swap Packages (ASPs) by means of an improved statistical arbitrage test. Using four different databases (GFI, Reuters, CMA, and J.P. Morgan) from 2005 to 2009, we find persistent mispricings between the CDS and ASP spreads of individual firms, which should be priced similarly, before and during the 2007–2009 financial crisis. These mispricings are more frequent in low credit quality bonds and appear to offer arbitrage opportunities. We also aggregate the firms' CDS and ASP in a portfolio and still find persistent deviations, mainly in the lower rated bonds. In aggregate terms the deviations from the parity relation can be explained from systematic factors such as financing costs, counterparty risk, and global risk. However, after considering realistic estimations of funding and trading costs, all these mispricings are unlikely to provide profitable arbitrage opportunities.

1. Introduction

In this paper we analyze statistical arbitrage opportunities from a strategy involving two credit derivatives contracts: Credit Default Swaps (CDSs) and Asset Swap Packages (ASPs). A CDS is a credit derivative designed to transfer the credit exposure of fixed income products between two parties. The purchaser of the CDS makes periodic payments (CDS premium or spread) to the seller until the maturity date of the contract or until a credit event materializes. In the latter case the seller pays off compensation to cover the purchaser's losses. An ASP contain a defaultable coupon bond and an interest rate swap (IRS) that swaps the bond's coupon into Euribor rate plus the asset swap spread rate. CDS premiums and ASP spreads are market-based measures of credit risk for a given reference name. Investing in an ASP, funded with a loan at the Euribor rate, has the same economic risk profile as selling protection through a CDS. As a result, no-arbitrage arguments imply that the CDS premium should be similar to the asset swap spread. Statistical arbitrage represents a zero cost, self-financing trading opportunity that has positive expected cumulative trading profits with a declining time-averaged variance and a probability of loss that converges to zero. The statistical arbitrage analysis is designed to detect persistent anomalies.

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The statistical arbitrage test was introduced by Hogan et al. (2004) (HJTW henceforth) and later improved in Jarrow et al. (2012) (JTTW henceforth). These authors test statistical arbitrage on stock markets on the basis of the increment in cumulative trading profits associated with the corresponding strategies. HJTW analyzes momentum and value trading strategies while JTTW extends the analysis to stock liquidity and industry momentum strategies. Both studies find that these strategies generate statistical arbitrage opportunities even after adjusting for market frictions such as transaction costs, margin requirements, liquidity buffers for the marking-to-market of short-sales, and borrowing rates.

The investment strategy to be analyzed in this study is the equivalence relation between the credit spreads obtained from CDS and ASP. The strategy is based on the equivalence relation arising from a cash-and-carry strategy in which a given investor trades two self-financing portfolios based on credit derivatives. The first portfolio contains a long position in a CDS while the second contains a long position in an ASP funded at Euribor. This second portfolio is equivalent to a synthetic short position in a CDS. For this reason, there should be an equivalence relation between the payoffs of both portfolios, which are given by the CDS premium and the asset swap spread, respectively. Thus, contrary to previous statistical arbitrage tests, ours is employed to find persistent mispricings.

The analysis of the equivalence relation between credit spreads has been traditionally done on the basis of the cointegration test proposed by Engle and Granger (1987). For instance, Blanco et al. (2005) and Zhu (2006) analyze this equivalence relation for CDS and bond spreads and find support, in general, for the parity relation as a long-run equilibrium condition. Zhu (2006) also analyzes the determinants of the basis, defined as the difference between the CDS and bond spreads and shows that both spreads respond differently to credit conditions such as rating events. Trapp (2009) analyzes trading opportunities that arise from differences between the bond and the CDS market and show that the basis size is closely related to measures of company-specific credit risk and liquidity, and to market conditions. Bai and Collin-Dufresne (2011) test several possible explanations for the violation of the arbitrage relation between cash bond and CDS contract and find several drivers related to funding risk, counterparty risk, and collateral quality that force the individual CDS-bond basis into negative territory at different phases of the crisis.

Previous literature has addressed other arbitrage strategies in fixed income markets such as swap spread, yield curve, mortgage, volatility, and capital structure arbitrages (see Duarte et al., 2007). These authors find that all the five previous strategies yield positive excess returns which are positively skewed. Jarrow et al. (2009) explore arbitrage opportunities in the term structure of CDS spreads and point out potential for arbitrage in this term structure on the basis of the Sharpe ratios obtained. Yu (2006) uses the HJTW procedure to detect statistical arbitrage in monthly capital structure arbitrage returns generated with CDS and stock price data. Capital structure arbitrage is based on strategies trading equity instruments against CDSs. Nevertheless, the analysis of statistical arbitrage in the context of the CDS–ASP basis had not been addressed before.

Our paper contributes to the literature in three dimensions. The first contribution is that, to the best of our knowledge, ours is the first paper that applies the statistical arbitrage methodology to study the relation between two credit derivatives (CDS and ASP) whose spreads, or prices for credit risk, should be similar. The use of asset swap spreads should allow a more precise analysis of the parity relation between CDS and bond spreads.[1] We apply the statistical arbitrage test to the CDS and ASP spreads of individual firms and also to portfolios of firms. To take into account the effects of the 2007–2009 financial crisis, we analyze two different sub-samples covering the periods before and during the crisis. The empirical evidence suggests that there is one key factor that determines the existence of statistical arbitrage: the issuer's credit risk. Thus, the lower the bond's credit quality, the higher the probability of persistent deviations between CDSs and ASPs spreads.

The second contribution is an enhanced version of the JTTW test that allows for non-normal, autocorrelated and heteroskedastic innovations of the incremental trading profits. Our test is based on the subsampling methodology developed in Politis et al. (1995, 1997, 1999a, 1999b). This technique is based on asymptotic inference and provides an asymptotically valid test under weak assumptions. Our results suggest that, for the data employed in the empirical exercise, the new test finds potential arbitrage opportunities with lower downside risk than existing alternatives.

Our third contribution is methodological. We present a procedure which is more appropriate for misprice testing than traditional alternatives. The analysis of the equivalence relation between credit spreads has been traditionally done on the basis of the cointegration test. The validity of the cointegration methodology is based on the assumption that bonds or ASPs can be shorted to guarantee that the equivalence relation holds. A cointegration test cannot isolate by itself strategies in which an ASP short sale is involved because it is based on both types of deviations from the equivalence relation. Nevertheless, according to Schonbucher (2003) and Mengle (2007) shorting a corporate bond with a required maturity, even years, is not always a feasible option.[2] It implies that traders might not be able to exploit deviations in the equivalence relation when the CDS premium is higher than the asset swap spread and so, ASP short positions are necessary. However, our test allows us to study the existence of statistical arbitrage whenever only long positions in ASPs are needed. Thus, our methodological proposal overcomes two problems that arise from the use of the cointegration analysis (i) bonds or ASPs short sales restrictions and (ii) the actual risk incurred to obtain arbitrage profits. Hence, we focus our analysis to testing the cases in which only long positions in CDSs and ASPs are needed. This trading strategy is known as a long basis trade. Additionally, and for the sake of completeness, we extend the study to test the strategies that are based on taking short position in ASPs and CDSs, which are known as short basis trades.

Using four different CDS databases (GFI, CMA, Reuters, and J.P. Morgan) and a sample of 55 bonds from November 2005 to August 2007, we find 16 persistent mispricings in which the long bases are persistently positive. A persistent positive long basis implies that the CDS spreads are too low in comparison with asset swap spreads. Employing a sample of 46 cases covering the

[1] This finding has been documented by Mayordomo et al. (2011), among others.

[2] The short sale of bonds or ASPs could be done via a repurchase agreement (repo) but the repo market for corporate bonds is illiquid and even if it was possible to short a bond via a repo, the tenor of the agreement would be short.